The Inclusions' Behavior in Cd(Mn,Zn)Te Crystals

Fochuk P.[1], Kopach O.[1], Verzhak Ye.[1], Shcherbak L.[1], Panchuk O.[1], Bolotnikov A.[2], James R. B.[2]

[1]*Chernivtsi National University, Chernivtsi, Ukraine*
[2]*Brookhaven National Laboratory, Upton, USA*

The quality of gamma- and X-ray detectors prepared from Cd(Mn,Zn)Te crystals at the current time can be sufficiently improved by inclusion size/content reductions. This is possible by long-term thermal annealing under Cd overpressure. Another possible method is to move inclusions in a temperature field gradient. Therefore our task was to study the inclusions' behavior in Cd(Mn,Zn)Te crystals under thermal treatment in or without a temperature gradient field.

Cd(Mn,Zn)Te single crystals were grown by the Bridgman method. A series of annealing experiments under different conditions (temperature, Cd overpressure, annealing time, and cooling rate) was performed. The obtained results allowed us to determine the optimal temperature and time for sample treatment at ~1100 K and times up to 1 hour (Fig. 1). No visible inclusions can be detected by IR microscopy after annealing under these conditions. Annealing in a temperature field gradient under a Cd overpressure was performed at different temperature gradients in range of 900-1000 K. The experiments demonstrated inclusion movement in Cd(Mn,Zn)Te crystals if the inclusion dimensions exceeded ~30 microns. The optimal temperature for inclusion migration is 950 K.

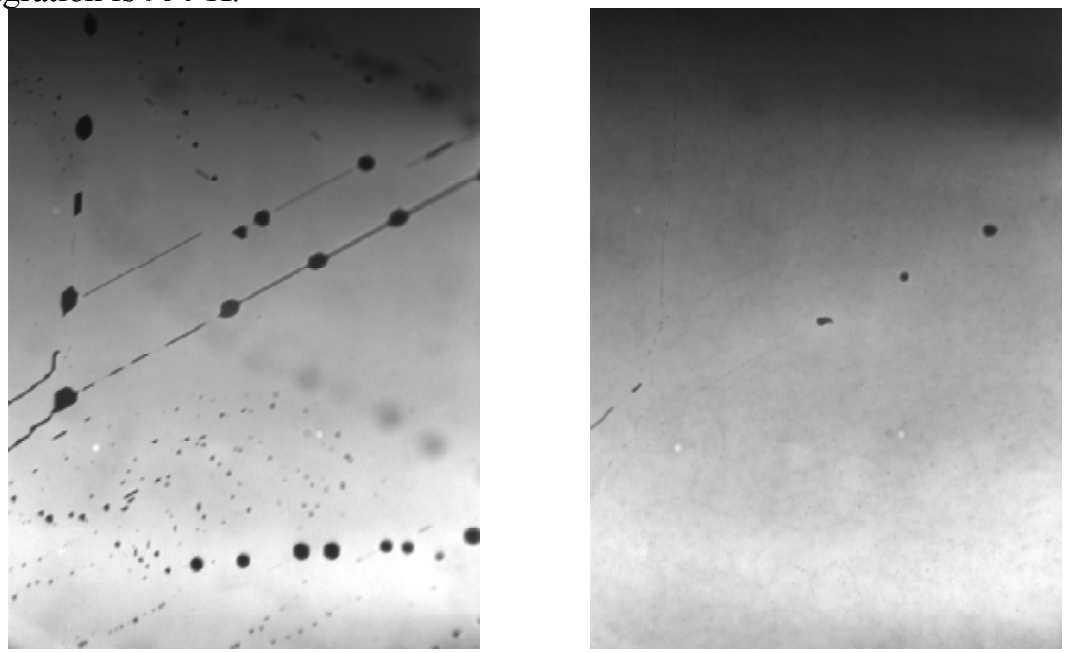

Fig. 1. The IR images of Cd(Zn)Te before (left) and after (right) annealing at 1100 K during 60 min. under Cd overpressure.